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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,366	12/09/2003	Kenneth Boyd	81092490FGT1889	1365

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EXAMINER
THORNEWELL, KIMBERLY A

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/707,366	BOYD ET AL.	
	Examiner	Art Unit	
	Kimberly Thornewell	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION. .

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. In the Office Action dated 2/27/2007, claims 1-20 were rejected. In the reply dated 5/2/2007, Applicants amended claims 1, 10, and 19. Therefore all of claims 1-20 remain pending in the instant application.

Response to Arguments

2. Applicant's arguments filed 5/2/2007 have been fully considered but they are not persuasive.

Title Objection

3. Applicants are thanked for amending the title in order to clarify the claimed invention. Accordingly, this objection is withdrawn.

Claim Rejections, 35 USC § 112

4. The Examiner thanks Applicants for amending claim 1 in order to clarify the "initial" and "first" steering wheel angle input. However, it is noted that the terms "steering wheel input" and "steering wheel angle" input are used interchangeably throughout the claim. The terms "the initial steering wheel angle input" (line 12) and "the first steering wheel input" (line 16) lack sufficient antecedent basis. Therefore, the rejection of claims 1-9 under 35 USC § 112, second paragraph, is currently maintained.

Claim Rejections, 35 USC § 101

5. The Examiner thanks Applicants for amending claim 19 in order to overcome the rejection under 35 USC § 101. Therefore, the rejection is withdrawn.

Claim Rejections, 35 USC § 102

6. Regarding claims 1 and 10,

Applicants argued that Rossetter fails to disclose or suggest determining an initial steering wheel input to the computer model or determining a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input (Remarks page 7 last paragraph). The Examiner respectfully traverses these arguments.

As to the argument that Rossetter does not disclose determining an initial steering wheel input to the computer model, the Examiner respectfully directs Applicants' attention to page 8 of Rossetter, first full paragraph. In this section, Rossetter discloses initial conditions for simulation, having typical driving speed and an initial offset from the lane center. According to Rossetter, in this simulation, the other states, including the steering angle, are initially set to zero. The steering angle is taught in Rossetter, for example, at the paragraph bridging pages 4 and 5. Therefore, it is respectfully submitted that Rossetter teaches determining an initial steering wheel input to the computer model.

In response to the argument that Rossetter does not teach determining a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input, the Examiner respectfully points to page 8 last paragraph. In this section Rossetter discusses how the simulation of page 8 first full paragraph is controlled by a virtual force. As

taught on page 4 section 3 first paragraph, the virtual force is derived by control inputs, including the steering angle. Therefore, it is submitted that during the run of Rossetter's simulation, steering angle inputs are determined at times later than the initial steering angle input in order to determine the virtual force. Therefore, it is respectfully submitted that Rossetter teaches determining a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input.

Because Rossetter teaches each and every element of Applicants' claims 1 and 10, the rejection of these claims under 35 USC § 102 is maintained.

7. Regarding claims 3, 4, 8, 9, 12-13 and 17-18,

Applicants presented no specific arguments with respect to these claims. Accordingly, the rejection of these claims under 35 USC § 102 is maintained, as well.

Claim Rejections, 35 USC § 103

8. Regarding claims 2, 5-7, 11 and 14-16,

Because the rejection of claims 1 and 10 under 35 USC § 102 is maintained, and also because Applicants presented no further specific arguments with respect to these claims, the rejection of these claims under 35 USC § 103(a) is maintained.

9. Regarding claim 19,

Similar to claims 1 and 10 above, Applicants argued that Rossetter does not disclose or suggest Applicants' initial or first steering wheel inputs (Remarks page 8 first full paragraph).

However, because Rossetter does teach these claimed features, the rejection of claim 19 under 35 USC § 103(a) is maintained.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 contains the limitations "the initial steering wheel angle input" (line 12) and "the first steering wheel input" (line 16). There is insufficient antecedent basis for these limitations in the claim. Claims 2-9 are rejected by virtue of their dependency from claim 1.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1, 3-4, 8-10, 12-13 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Rossetter et al., "A Study of Lateral Vehicle Control Under a 'Virtual' Force Framework," Proceedings of the 2002 AVEC Conference.

As per claim 1,

Rossetter discloses a simulation system and method for simulating an operation of an automotive vehicle comprising:

- An input providing vehicle information (**page 3 figure 1**, *vehicle model*) and path information (**page 6 figure 3**, *coordinates based on road centerline*);
- A controller having a vehicle computer model therein (**page 2 second full paragraph**), said controller programmed to determine a rear side slip angle of a vehicle computer model (**page 3 equation 9**);
- Determine an initial steering wheel input to the computer model (**page 8 first full paragraph**; *initial states set to zero*);
- When the rear side slip angle is greater than a threshold (**page 13 last paragraph,** *varying lookahead as vehicle is oversteering*), determine a look ahead scale factor (**page 12 equation 33**);
- When the rear side slip angle is greater than the threshold, increase a look ahead point as a function of the look ahead scale factor (**page 12 equation 35 and definitions of d1-d4**);
- Determine a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input (**page 8 last paragraph**, *determining virtual forces from steering angle*) by comparing the look ahead point and the intended path (**page 15 equation 38**);
- Operate the computer model with the initial steering wheel angle input (**page 8 first full paragraph, also Figure 5**); and

- Generate an output in response to the vehicle model and the initial steering wheel input or first steering wheel input (**page 16 second paragraph**, *manipulating inputs to get a desired output*).

As per claim 3,

Rossetter discloses the controller being programmed to determine a longitudinal vehicle velocity and a lateral vehicle velocity (**page 4 section 3 first paragraph**) and determine the rear side slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity (**page 3 equations 10 and 11**).

As per claim 4,

Rossetter discloses the controller being programmed to determine a look ahead scale factor as a function of the rear side slip angle (**page 12 equation 33**).

As per claim 8,

Rossetter discloses when the rear side slip angle is not greater than the threshold, the controller is programmed to determine an unscaled look ahead factor (**page 13 first full paragraph**).

As per claim 9,

Rossetter discloses the controller being programmed to determine a steering wheel angle input when the vehicle is not on target (**page 4 last paragraph**).

As per claim 10,

Rossetter discloses a method of operating a vehicle computer model having vehicle information and path information therein, the method operating on a digital computer system and comprising:

- Determining a rear side slip angle of a vehicle computer model (**page 3 equation 9**);
- Determining an initial steering wheel input to the computer model (**page 8 first full paragraph**; *initial states set to zero*);
- When the rear side slip angle is greater than a threshold (**page 13 last paragraph,** *varying lookahead as vehicle is oversteering*), determining a look ahead scale factor (**page 12 equation 33**);
- When the rear side slip angle is greater than the threshold, increasing a look ahead point as a function of the look ahead scale factor (**page 12 equation 35 and definitions of d1-d4**);
- Determining a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input (**page 8 last paragraph**, *determining virtual forces from steering angle*) by comparing the look ahead point and the intended path (**page 15 equation 38**);
- Operating the computer model with the initial or first steering wheel angle input (**page 8 first full paragraph, also Figure 5**); and

- Outputting results of the operating step (**page 16 second paragraph**, *manipulating inputs to get a desired output*).

As per claim 12,

Rossetter discloses the controller being programmed to determine a longitudinal vehicle velocity and a lateral vehicle velocity (**page 4 section 3 first paragraph**) and determine the rear side slip angle as a function of the longitudinal vehicle velocity and the lateral vehicle velocity (**page 3 equations 10 and 11**).

As per claim 13,

Rossetter discloses the controller being programmed to determine a look ahead scale factor as a function of the rear side slip angle (**page 12 equation 33**).

As per claim 17,

Rossetter discloses when the rear side slip angle is not greater than the threshold, the controller is programmed to determine an unscaled look ahead factor (**page 13 first full paragraph**).

As per claim 18,

Rossetter discloses the controller being programmed to determine a steering wheel angle input when the vehicle is not on target (**page 4 last paragraph**).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 2, 5-7, 11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rossetter as applied to claims 1, 3-4, 8-10, 12-13 and 17-18 above, in view of O'Brien et al., "Vehicle Lateral Control for Automated Highway Systems," IEEE Transactions on Control Systems Technology, May 1996.

As per claims 2 and 11,

Rossetter does not disclose expressly the threshold for the rear side slip angle being about 15 degrees. O'Brien discloses a method and system for operation of an automotive vehicle (**abstract**). O'Brien teaches calculating the slip of a vehicle (**page 268, equation 2**), and that the ideal maximum slip for a vehicle is 15 percent (**page 268 second full paragraph**).

It would have been obvious to one of ordinary skill in the art of steering simulation, at the time of the present invention, to modify Rossetter's steering simulation system and method with O'Brien's maximum slip rate in order to achieve a design choice of a threshold of 15 degrees for a side slip angle. The motivation fordoing so would have been to determine a steering wheel angle input based on the amount of circumferential force on the tire (O'Brien page 268 second full paragraph).

As per claims 5 and 14,

Rossetter does not disclose expressly a look ahead factor being determined as a function of an exponential of the rear side slip angle. O'Brien discloses a method and system for operation of an automotive vehicle (**abstract**). O'Brien teaches a look ahead factor as a function of an exponential of the rear side slip angle (**page 268 equation 4**, *side force*).

It would have been obvious to one of ordinary skill in the art of steering simulation, at the time of the present invention, to modify Rossetter's steering simulation system and method with O'Brien's formula for determining side force in able to determine a look ahead factor as a function of an exponential of the rear side slip angle. The motivation for doing so would have been to improve flexibility by being able to simulate the steering of a vehicle for a large range of operating conditions (O'Brien page 273 column 1 third full paragraph).

As per claims 6 and 15,

Rossetter does not disclose expressly a look ahead factor being determined as a function of an exponential of a product of the rear side slip angle and a constant. O'Brien discloses a method and system for operation of an automotive vehicle (**abstract**). O'Brien teaches a look ahead factor as a function of an exponential of a product of the rear side slip angle and a constant (**page 268 equation 4**, *side force*).

It would have been obvious to one of ordinary skill in the art of steering simulation, at the time of the present invention, to modify Rossetter's steering simulation system and method with O'Brien's formula for determining side force in able to determine a look ahead factor as a function of an exponential of a product of the rear side slip angle and a constant. The motivation

for doing so would have been to improve flexibility by being able to simulate the steering of a vehicle for a large range of operating conditions (O'Brien page 273 column 1 third full paragraph).

As per claims 7 and 16,

O'Brien discloses the constant being about .02 (**page 268 column 1 third full paragraph**).

16. Claims 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rossetter as applied to claims 1, 3-4, 8-10, 12-13 and 17-18 above, in view of Chen et al., "Differential-Braking-Based Rollover Prevention for Sport Utility Vehicles with Human-in-the-loop Evaluations," Vehicle System Dynamics, November 2001.

As per claim 19,

Rossetter discloses a method of operating a vehicle computer model having vehicle information and path information therein comprising:

- Determining a rear side slip angle of a vehicle computer model (**page 3 equation 9**);
- Determining a look ahead point (**page 13 last paragraph**, *increasing look ahead*);

- When the rear side slip angle is greater than a threshold (**page 13 last paragraph,** *varying lookahead as vehicle is oversteering*), determining a look ahead scale factor (**page 12 equation 33**);
- When the rear side slip angle is greater than the threshold, increasing the look ahead point as a function of the look ahead scale factor (**page 12 equation 35 and definitions of d1-d4**);
- When the rear side slip angle is less than the threshold, maintaining the look ahead point (**page 13 first full paragraph**); and
- Operating the computer model with the steering wheel angle input (**page 13 first full paragraph**, *applying the neutral steer point*).
- Outputting results of the operating step (**page 16 second paragraph**, *manipulating inputs to get a desired output*).

Rossetter does not disclose expressly determining a steering wheel angle input to the computer model as a function of an error between the look ahead point and the intended path when the vehicle is off target. Chen discloses a method for simulating controlling of steering for a vehicle in order to calculate time-to-rollover (**abstract**). Chen further discloses determining a steering wheel angle input when the vehicle model is off target (**page 11 figure 18**) as a function of error between the look ahead point and the intended path (**figure 19, page 12 first paragraph**).

It would have been obvious to one of ordinary skill in the art of steering simulation, at the time of the present invention, to modify Rossetter's vehicle computer model operation method

with Chen's algorithm for determining a steering wheel angle input as a function of error between the look ahead point and the intended path. The motivation would have been to optimize cost by minimizing previewed path errors (**Chen page 12 second paragraph**).

17. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rossetter as applied to claims 1, 3-4, 8-10, 12-13 and 17-18 above, in view of Chen as applied to claim 19 above, and further in view of O'Brien as applied to claims 2, 5-7, 11, and 14-16 above.

As per claim 20,

Neither Rossetter nor Chen disclose expressly a look ahead factor being determined as a function of an exponential of the rear side slip angle. O'Brien discloses a method and system for operation of an automotive vehicle (**abstract**). O'Brien teaches a look ahead factor as a function of an exponential of the rear side slip angle (**page 268 equation 4**, *side force*).

It would have been obvious to one of ordinary skill in the art of steering simulation, at the time of the present invention, to modify Rossetter/Chen's steering simulation system and method with O'Brien's formula for determining side force in able to determine a look ahead factor as a function of an exponential of the rear side slip angle. The motivation for doing so would have been to improve flexibility by being able to simulate the steering of a vehicle for a large range of operating conditions (O'Brien page 273 column 1 third full paragraph).

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Thornewell whose telephone number is (571)272-6543. The examiner can normally be reached on 9am-5:30pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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